UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/613,992	07/08/2003	Masahiko Kubota	03500.017378.	6238

5514 7590 09/01/2005

FITZPATRICK CELLA HARPER & SCINTO
30 ROCKEFELLER PLAZA
NEW YORK, NY 10112

EXAMINER	
MRUK, GEOFFREY S	

ART UNIT	PAPER NUMBER
2853	

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/613,992	KUBOTA ET AL.	
	Examiner	Art Unit	
	Geoffrey Mruk	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/8 12/5 6/24/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 3-11 and 18-21 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-11 of U.S. Patent No. 6,910,760 B2. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject claimed in the instant application is fully disclosed in the patent and is covered in the patent since the patent and the application are claiming common subject matter as follows:

Claims 1, 3-11 and 18-21 in the filed application for a liquid discharge head and an ink jet recording head are covered by claims 1-11 respectively in the prior art as shown in Tables 1, 2, 3, 4, and 5 below.

Table 1

Patent Claims	Pending Claims
1. A liquid discharge head comprising: a discharge energy generating element for generating energy for discharging a liquid droplet; an element base plate provided with said discharge energy generating element on a main surface thereof; and an orifice base plate bonded to the main surface of said element base plate, being provided with a nozzle having a discharge port portion with a discharge port for discharging the liquid droplet, a bubbling chamber for generating a bubble in liquid therein by said discharge energy generating element, and a supply path for supplying liquid to said bubbling chamber, and a supply chamber for supplying liquid to said nozzle, wherein said bubbling chamber is formed by a first bubbling chamber communicated with said supply path with the main surface of said element base plate as the bottom face thereof for generating the bubble in liquid therein by said discharge energy generating element, and also, a second bubbling chamber communicated with said first bubbling chamber, and the central axis of the lower face of said second bubbling chamber and the central axis of the upper face of said second bubbling chamber are in agreement in the direction perpendicular to said base plate, and the sectional area of the upper face with respect to the central axis of said second bubbling chamber is smaller than the sectional area of the lower face with respect to the central axis of said second bubbling chamber, and the sectional area in the direction toward the central axis is continuously changed from the lower face to the upper face of said second bubbling chamber, and on the circumferential portion of the upper face of said first bubbling chamber in parallel with the main surface of said element base plate, and in contact with the opening communicated with said second bubbling chamber, an extrusion is formed continuously to surround said opening in the direction toward the main face of said element base plate. 2. A liquid discharge head according to claim 1, wherein the sectional area of the sidewall face of said second bubbling chamber is continuously changed in the direction toward the central axis from the lower face to the upper face of said second bubbling chamber at an inclination of 10 to 45 degree to the plane orthogonal to the main surface of said element base plate.	1. A liquid discharge head comprising: a discharge energy generating element for generating energy for discharging a liquid droplet; an element substrate having a main surface on which said discharge energy generating element is provided; a discharge port portion having a discharge port for discharging the liquid droplet; a nozzle having a bubbling chamber in which a bubble is generated in liquid by said discharge energy generating element and a supply path for supplying the liquid to said bubbling chamber; a supply chamber for supplying the liquid to said nozzle; and an orifice substrate joined to the main surface of said element substrate wherein said bubbling chamber includes a first bubbling chamber which communicates with said supply path and uses a portion of the main surface of said element substrate as a bottom surface of said first bubbling chamber and in which the bubble is generated in the liquid by said discharge energy generating element and a second bubbling chamber communicating with said first bubbling chamber, said second bubbling chamber communicates with said discharge port portion, a central axis of a lower surface of said second bubbling chamber extending through a center of said lower surface of said second bubbling chamber in a direction perpendicular to said substrate coincides with a central axis of an upper surface of said second bubbling chamber extending through a center of said upper surface of said second bubbling chamber in a direction perpendicular to said substrate, a cross-sectional area of the said upper surface with respect to the a central axis of said second bubbling chamber extending through the center of said second bubbling chamber in a direction perpendicular to said substrate is smaller than a cross-sectional area of the said lower surface with respect to the central axis of said second bubbling chamber, the a cross-sectional area in of said second bubbling chamber with respect to the central axis of said second bubbling chamber changes continuously from the said lower surface to the said upper surface of said second bubbling chamber, such that a side wall surface of said second bubbling chamber has an inclination of 10 to 45 degrees with respect to a plane perpendicular to the main surface of said element substrate and the cross-sectional area of the said upper surface with respect to the renter central axis of said second bubbling chamber is greater than a cross-sectional area of said discharge port portion with respect to a central axis of said discharge port portion.

Table 2

Patent Claims	Pending Claims
3. A liquid discharge head according to claim 1, wherein said first bubbling chamber is surrounded by a nozzle wall in three directions for partitioning a plurality of said nozzles arranged in parallel condition into each individual nozzle, and a wall face of said discharge port portion is in parallel with the plane orthogonal to the main surface of said element base plate.	3. A liquid discharge head according to claim 1, further comprising plural nozzles wherein said first bubbling chamber is enclosed, in three directions, by nozzle walls for partitioning said plural nozzles arranged in parallel to form individual nozzles and, a wall surface of said discharge port portion is parallel with a line perpendicular to the main surface of said element substrate.
4. A liquid discharge head according to claim 1, wherein said first bubbling chamber is surrounded by a nozzle wall in three directions for partitioning a plurality of said nozzles arranged in parallel condition into each individual nozzle, and a wall face of said discharge port portion is provided with a taper of 10 degrees or less to the plane orthogonal to the main surface of said element base plate.	4. A liquid discharge head according to claim 1, further comprising plural nozzles wherein said first bubbling chamber is enclosed, in three directions, by nozzle walls for partitioning said plural nozzles arranged in parallel to form individual nozzles and, a wall surface of said discharge port portion has g taper of less than 100 with respect to the plane perpendicular to the main surface of said element substrate.
5. A liquid discharge head according to claim 1, wherein the upper face of said supply path on the said supply chamber side in parallel with the main surface of said element base plate is higher than the upper face of said supply path continued on one and the same plane with the upper surface of said first bubbling chamber, and connected with a difference in level, and the largest height of said supply path from the surface of said element base plate is lower than the height from the surface of said element base plate to the upper face of said second bubbling chamber.	5. A liquid discharge head according to claim 1, wherein an upper surface of said supply path parallel with the main surface of said element substrate near said supply chamber is higher than an upper surface of said supply path contiguous to and flush with an upper surface of said first bubbling chamber and is connected to the latter upper surface via a stepped portion, and a maximum height of said supply path from the main surface of said element substrate to the former upper surface is smaller than a height from the main surface of said element substrate to the upper surface of said second bubbling chamber.
6. A liquid discharge head according to claim 1, wherein at least in a part of said supply path, the width of said supply path on the plane orthogonal to the flow direction of liquid is changed in the thickness direction of said orifice base plate.	6. A liquid discharge head according to claim 1, wherein a height of said supply path on in a plane perpendicular to a flowing direction of the liquid is changed in a thickness direction of said orifice substrate in a vicinity of a stepped portion that connects an upper surface of said supply path parallel with the main surface of said element substrate near said supply chamber with an upper surface of said supply path contiguous to and flush with an upper surface of said first bubbling chamber.
7. A liquid discharge head according to claim 1, wherein the sectional area of said nozzle from said discharge port to said supply chamber is further structured to be changed by plural differences in level.	7. A liquid discharge head according to claim 1, wherein said nozzle is desired so that a cross-sectional area of the a flow path extending from said discharge port to said supply chamber is changed with plural stages.
8. A liquid discharge head according to claim 1, wherein said nozzle is formed so as to orthogonalize the discharge direction of flying droplets from said discharge port and the flowing direction of liquid flowing in said supply path.	8. A liquid discharge head according to claim 1, wherein said nozzle is formed so that a discharging direction along which the liquid droplet is ejected from said discharge port is perpendicular to a flowing direction of the liquid flowing in said supply path.

Table 3

Patent Claims	Pending Claims
9. A liquid discharge head according to claim 1, wherein said nozzle is formed so as to make the total sum of the volumes of said first bubbling chamber, the second bubbling chamber, and the discharge port portion smaller than the volume of said supply path.	9. A liquid discharge head according to claim 1, wherein said nozzle is formed so that the sum of volumes of said first bubbling chamber, said second bubbling chamber and said discharge port portion is smaller than a volume of said supply path.
10. A liquid discharge head according to claim 1, wherein the bubble generated by said discharge energy generating element is communicated with the air outside at the time of discharging the liquid droplet.	10. A liquid discharge head according to claim 1, wherein the bubble generated by said discharge energy generating element communicates with the atmosphere during the discharging.
11. A liquid discharge head according to claim 1, wherein said orifice base plate is provided with plural nozzles corresponding to plural discharge energy generating elements, respectively, and said plural nozzles are divided into a first nozzle array having the longitudinal direction of each nozzle arranged in parallel, and a second nozzle array having the longitudinal direction of each nozzle arranged in parallel in the position facing said first nozzle array with said supply chamber between them, and the center line of each of said nozzles in said second nozzle array is arranged so as to be displaced by 1/2 pitch between each of adjacent nozzles with respect to the center line in the longitudinal direction of each of said nozzles of said first nozzle array.	11. A liquid discharge head according to claim 1, wherein said orifice substrate is provided with plural nozzles and plural discharge energy generating elements corresponding thereto respectively and said plural nozzles are divided into a first nozzle array and a second nozzle array which is disposed at a position opposed to said first nozzle array with said supply chamber being interposed between said first and second nozzle arrays longitudinal directions of the nozzles in said first nozzle array are parallel and longitudinal directions of the nozzles in said second nozzle array are parallel and longitudinal central axes of said nozzles in said second nozzle array are disposed so as to be offset by 1/2 pitch with respect to longitudinal central axes of adjacent ones of said nozzles in said first nozzle array.

Table 4

Patent Claims	Pending Claims
1. A liquid discharge head comprising: a discharge energy generating element for generating energy for discharging a liquid droplet; an element base plate provided with said discharge energy generating element on a main surface thereof; and an orifice base plate bonded to the main surface of said element base plate, being provided with a nozzle having a discharge port portion with a discharge port for discharging the liquid droplet, a bubbling chamber for generating a bubble in liquid therein by said discharge energy generating element, and a supply path for supplying liquid to said bubbling chamber, and a supply chamber for supplying liquid to said nozzle, wherein said bubbling chamber is formed by a first bubbling chamber communicated with said supply path with the main surface of said element base plate as the bottom face thereof for generating the bubble in liquid therein by said discharge energy generating element, and also, a second bubbling chamber communicated with said first bubbling chamber, and the central axis of the lower face of said second bubbling chamber and the central axis of the upper face of said second bubbling chamber are in agreement in the direction perpendicular to said base plate, and the sectional area of the upper face with respect to the central axis of said second bubbling chamber is smaller than the sectional area of the lower face with respect to the central axis of said second bubbling chamber, and the sectional area in the direction toward the central axis is continuously changed from the lower face to the upper face of said second bubbling chamber, and on the circumferential portion of the upper face of said first bubbling chamber in parallel with the main surface of said element base plate, and in contact with the opening communicated with said second bubbling chamber, an extrusion is formed continuously to surround said opening in the direction toward the main face of said element base plate.	18. A ink jet recording head comprising: an element substrate having a main surface on which a discharge energy generating element for generating energy for discharging a liquid droplet is provided; a discharge port portion having a discharge port at one end thereof the discharge port being opposed to said discharge energy generating element; a supply path for supplying liquid to said discharge port portion; a first bubbling chamber using a portion of the main surface of said element substrate as a bottom surface and communicating with said supply path, a bubble being generated in liquid in the first bubbling chamber by said discharge energy generating element; and a second bubbling chamber having one end portion communicating with said first bubbling chamber and another end portion communicating with another end of said discharge port portion, wherein a cross-sectional area of said first bubbling chamber, taken in a plane parallel to the main surface of said element substrate, is larger than a cross-sectional area of said second bubbling chamber, taken in the plane parallel to the main surface of said element substrate, and the cross-sectional area of said second bubbling chamber, taken in the plane parallel to the main surface of said element substrate, is larger than a cross-sectional area of said discharge port portion, taken in a plane parallel to the main surface of said element substrate, wherein each of a connecting portion between a side wall surface of said first bubbling chamber and a side wall surface of said second bubbling chamber and a connecting portion between a side wall surface of said second bubbling chamber and a side wall surface of said discharge port portion has a stepped portion, wherein the side wall surface of said second bubbling chamber has a tapered shape such that an end portion of the side wall surface of said second bubbling chamber at the discharge port portion is smaller than an end portion of the side wall surface of said second bubbling chamber at said first bubbling chamber.

Table 5

Patent Claims	Pending Claims
1. A liquid discharge head comprising: a discharge energy generating element for generating energy for discharging a liquid droplet; an element base plate provided with said discharge energy generating element on a main surface thereof; and an orifice base plate bonded to the main surface of said element base plate, being provided with a nozzle having a discharge port portion with a discharge port for discharging the liquid droplet, a bubbling chamber for generating a bubble in liquid therein by said discharge energy generating element, and a supply path for supplying liquid to said bubbling chamber, and a supply chamber for supplying liquid to said nozzle, wherein said bubbling chamber is formed by a first bubbling chamber communicated with said supply path with the main surface of said element base plate as the bottom face thereof for generating the bubble in liquid therein by said discharge energy generating element, and also, a second bubbling chamber communicated with said first bubbling chamber, and the central axis of the lower face of said second bubbling chamber and the central axis of the upper face of said second bubbling chamber are in agreement in the direction perpendicular to said base plate, and the sectional area of the upper face with respect to the central axis of said second bubbling chamber is smaller than the sectional area of the lower face with respect to the central axis of said second bubbling chamber, and the sectional area in the direction toward the central axis is continuously changed from the lower face to the upper face of said second bubbling chamber, and on the circumferential portion of the upper face of said first bubbling chamber in parallel with the main surface of said element base plate, and in contact with the opening communicated with said second bubbling chamber, an extrusion is formed continuously to surround said opening in the direction toward the main face of said element base plate.	19. An ink jet recording head according to Claim 18, wherein the side wall surface of said discharge port portion has a tapered shape so that an end portion of the side wall surface at a side of said discharge port is smaller than an end portion of the side wall surface at a side of said second bubbling chamber side.
2. A liquid discharge head according to claim 1, wherein the sectional area of the sidewall face of said second bubbling chamber is continuously changed in the direction toward the central axis from the lower face to the upper face of said second bubbling chamber at an inclination of 10 to 45 degree to the plane orthogonal to the main surface of said element base plate.	20. An ink jet recording head according to Claim 18, wherein the side wall surface of said second bubbling chamber is formed with an inclination of 10 to 45 degrees with respect to a plane perpendicular to the main surface of said element substrate.
2. A liquid discharge head according to claim 1, wherein the sectional area of the sidewall face of said second bubbling chamber is continuously changed in the direction toward the central axis from the lower face to the upper face of said second bubbling chamber at an inclination of 10 to 45 degree to the plane orthogonal to the main surface of said element base plate.	21. An ink jet recording head according to Claim 19, wherein the side wall surface of said discharge port portion is formed with an inclination of 10 to 45 degrees with respect to a plane perpendicular to the main surface of said element substrate.

The preamble of application 10/613,992 does not limit the claimed invention because all the limitations of the invention are the same as the limitations in U.S. Patent No. 6,910,760 B2. Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use the liquid discharge head disclosed in U.S. Patent No. 6,910,760 B2 for the liquid discharge head to record an image on a recording medium, as claimed in the present application.

2. Claims 12-17 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 12-14 of copending Application No. 10/614,029. Although the conflicting claims are not identical, they are not patentably distinct from each other because the subject claimed in the instant application is fully disclosed in the patent and is covered in the patent since the patent and the application are claiming common subject matter as follows: Claims 12-17 in the filed application for a method for manufacturing a liquid discharge head are covered by claims 12-14 respectively in the prior art as shown in Tables 6, 7, and 8 below.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Table 6

Patent Claims	Pending Claims
12. A method for manufacturing the liquid discharge head provided with a discharge energy generating element for generating energy for discharging liquid a droplet; an element base plate provided with said discharge energy generating element on the main surface thereof; and an orifice base plate bonded to the main surface of said element base plate, being provided with a nozzle having a discharge port portion with a discharge port for discharging a liquid droplet, a bubbling chamber for generating bubble in liquid therein by said discharge energy generating element, and a supply path for supplying liquid to said bubbling chamber, and a supply chamber for supplying liquid to said nozzle, comprising the following steps of: forming a thermal bridging film on the element base plate having a discharge energy generating element provided for the main surface therefor by coating and heating thermo-bridge organic resin of solvent-dissolvable type for forming a pattern of the first bubbling chamber and supply path; coating on said thermal bridging film organic resin of solvent-dissolvable type for forming pattern of the second bubbling chamber; exposing and developing said organic resin for the pattern formation of said second bubbling chamber by use of Near-UV light in the region of 260 to 330 nm, and also, forming a recessed portion continuously on said thermo-bridge organic resin near the pattern for the formation of said second bubbling chamber in order to form said first bubbling chamber and said supply path; forming an inclination of 10 to 45 degrees by heating said organic resin at a temperature lower than that of glass transition after exposing and developing said thermal bridging film by use of Deep-UV light in the region of 210 to 330 nm; laminating the orifice base plate provided with discharge port portion by coating, exposing, developing and heating positive type organic resin on the flow path pattern formed by said double-layered solvent-dissolvable film; and forming the orifice base plate bonded to the main surface of said element base plate, being provided with the nozzle having said discharge port portion for discharging a liquid droplet, the bubbling chamber for generating bubble by said discharge energy generating element, and said supply path for supplying liquid to said bubbling chamber, and the supply chamber for supplying liquid to said nozzle by removing said double-layered flow path formation organic resin formed on the lower layer by irradiating Deep-UV light through said orifice base plate and by use of solvent.	12. A method for manufacturing a liquid discharge head comprising a discharge energy generating element for generating energy for discharging a liquid droplet, an element substrate having a main surface on which said discharge energy generating element is provided, a discharge port portion having a discharge port for discharging the liquid droplet, a nozzle having a bubbling chamber in which a bubble is generated in liquid by said discharge energy generating element and a supply path for supplying the liquid to said bubbling chamber, a supply chamber for supplying the liquid to said nozzle and an orifice substrate joined to the main surface of said element substrate, said bubbling chamber comprising a first bubbling chamber that communicates with said supply path and uses a portion of the main surface of said element substrate as a bottom surface of said first bubbling chamber and in which the bubble is generated in the liquid by said discharge energy generating element and a second bubbling chamber communicating with said first bubbling chamber and with said discharge port portion the method comprising the steps of coating a thermal bridge type organic resin soluble by solvent and adapted to forma pattern for said first bubbling chamber and a lower portion of said supply path on said element substrate having the main surface on which said discharge energy generating element is provided and heating the resin to form a thermal bridge film; coating an organic resin soluble by solvent and adapted to form a pattern for said second bubbling chamber and an upper portion of said supply path on said thermal bridge film so as to form a two-laver soluble film; exposing and developing the organic resin by using Near-UV light having a wavelength of 260 to 330 nm in order to form the pattern for said second bubbling chamber and the upper portion of said supply path; forming an inclination of 10 to 45 degrees on a side surface of the organic resin by heating the exposed, developed and pattern formed organic resin at a temperature lower than a glass transition point; exposing and developing said thermal bridge film by using Deep-UV light having a wavelength of 210 to 330 nm; laminating said orifice substrate having a the discharge port by coating, exposing, developing and heating g negative type organic resin on a flow path pattern formed by the two-layer soluble films; and forming said discharge port portion for discharging the liquid droplet, said nozzle having said bubbling chamber in which the bubble is generated in the liquid by said discharge energy generating element and said supply path for supplying the liquid to said bubbling chamber, said supply chamber for supplying the liquid to said nozzle and said orifice substrate joined to the main surface of said element substrate, by illuminating Deep-UV light onto said negative type organic resin thereby to remove the two-layer soluble film.

Table 7

Patent Claims	Pending Claims
12. A method for manufacturing the liquid discharge head provided with a discharge energy generating element for generating energy for discharging liquid a droplet; an element base plate provided with said discharge energy generating element on the main surface thereof; and an orifice base plate bonded to the main surface of said element base plate, being provided with a nozzle having a discharge port portion with a discharge port for discharging a liquid droplet, a bubbling chamber for generating bubble in liquid therein by said discharge energy generating element, and a supply path for supplying liquid to said bubbling chamber, and a supply chamber for supplying liquid to said nozzle, comprising the following steps of: forming a thermal bridging film on the element base plate having a discharge energy generating element provided for the main surface therefor by coating and heating thermo-bridge organic resin of solvent-dissolvable type for forming a pattern of the first bubbling chamber and supply path; coating on said thermal bridging film organic resin of solvent-dissolvable type for forming pattern of the second bubbling chamber; exposing and developing said organic resin for the pattern formation of said second bubbling chamber by use of Near-UV light in the region of 260 to 330 nm, and also, forming a recessed portion continuously on said thermo-bridge organic resin near the pattern for the formation of said second bubbling chamber in order to form said first bubbling chamber and said supply path; forming an inclination of 10 to 45 degrees by heating said organic resin at a temperature lower than that of glass transition after exposing and developing said thermal bridging film by use of Deep-UV light in the region of 210 to 330 nm; laminating the orifice base plate provided with discharge port portion by coating, exposing, developing and heating positive type organic resin on the flow path pattern formed by said double-layered solvent-dissolvable film; and forming the orifice base plate bonded to the main surface of said element base plate, being provided with the nozzle having said discharge port portion for discharging a liquid droplet, the bubbling chamber for generating bubble by said discharge energy generating element, and said supply path for supplying liquid to said bubbling chamber, and the supply chamber for supplying liquid to said nozzle by removing said double-layered flow path formation organic resin formed on the lower layer by irradiating Deep-UV light through said orifice base plate and by use of solvent.	13. A method according to claim 12, wherein said second bubbling chamber and the upper portion of said supply path are formed by pattern transferring, by using a photo-mask in which a pattern of said second bubbling chamber is a normal resolving power pattern of the organic resin and a pattern of the upper portion of said supply path is a pattern smaller than a limited resolving power of the organic resin and by using Near-UV light having a wavelength of 260 to 330 nm. 14. A method according to claim 12, wherein said exposing and developing step of the organic resin said second bubbling chamber and the upper portion of said supply path are divided into an area where the resin is removed completely, an area where the resin is removed partially and an area where the resin is not removed at all. 15. A method according to claim 14, wherein, in said exposing and developing step of the organic resin, said area where the resin is not removed at all forms said second bubbling chamber and said area where the resin is removed partially forms the upper portion of said supply path.

Table 8

Patent Claims	Pending Claims
13. A method for manufacturing the liquid discharge head according to claim 12, wherein the height of said first bubbling chamber and said supply chamber on said element base plate is 5 to 20 μm, and formed at an inclination of 0 to 10 degrees to the plane orthogonal to the main surface of said element base plate.	16. A method according to claim 12, wherein a height of said first bubbling chamber on said element substrate is 5 to 20 μm and a side wall of said first bubbling chamber is formed with an inclination of 0 to 10 degrees with respect to a plane perpendicular to the main surface of said element substrate.
14. A method for manufacturing the liquid discharge head according to claim 12, wherein the thermo-bridge organic resin for forming said first bubbling chamber and said supply path has methyl methacrylate as the main component, and formed by dissolving in coating solvent a material synthesized by polymerizing methacrylic acid and methacrylate ester.	17. A method according to claim 12, wherein the thermal bridge type organic resin for forming said first bubbling chamber and the lower portion of said supply path comprises methyl methacrylate and is formed by dissolving material obtained by being copolymerized with methacrylic acid and methacrylic acid ester in to a coating solvent.

The preamble of application 10/613,992 does not limit the claimed invention because all the limitations of the invention are the same as the limitations in U.S. Patent No. 6,910,760 B2. Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use the method for manufacturing a liquid discharge head disclosed in U.S. Patent No. 6,910,760 B2 for the liquid discharge head to record an image on a recording medium, as claimed in the present application.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Geoffrey Mruk whose telephone number is (571) 272-2810. The examiner can normally be reached on 7am - 330pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

GSM
8/23/2005

GM

8/26/05
MANISH S. SHAH
PRIMARY EXAMINER